

New Hampshire Volunteer Lake Assessment Program Turns 15 This Year!



*Celebrating 15 years of
Grassroots Efforts to Protect
New Hampshire's Precious
Lake Resources*

Thanks to All Our Volunteers!

State VLAP Lakes Holding Their Own

Stephanie Bowser, VLAP Coordinator

Many people believe that the water quality in our state is on the decline. With the population in New Hampshire on the rise and more and more seasonal lake homes becoming year-round residences, a decrease in lake quality almost seems inevitable. However, the data collected by the Volunteer Lake Assessment Program (VLAP) over the last 15 years presents a much more optimistic picture.

The Department of Environmental Services' biologists can collect only limited data due to staff limitations and the need to monitor over 800 lakes and ponds. Through our lake survey program, we are able to test approximately 40 to 50 lakes each year, meaning that every lake is tested once every 12 to 15 years. This makes it difficult to assess how lakes are changing in response to potentially

increasing pressures. Through the efforts of volunteers in the Volunteer Lake Assessment Program (VLAP), we have been able to report to the United States Environmental Protection Agency and Congress about these trends, far exceeding what DES could do without such help.

The data represented in the accompanying table shows the trends in water quality we have observed in VLAP monitored lakes. In general, you may notice that algae abundance, as indicated by chlorophyll-a concentrations; water clarity, as measured with a Secchi disk; and total

Quality Trends in VLAP Lakes

	Chlorophyll-a	Water Clarity	Phosphorus	Overall Quality
Improving	31%	22%	28%	19%
Stable	51%	55%	48%	62%
Worsening	18%	23%	29%	19%

see Lake Trends on page 3

Connor's Corner



Jody Connor
Limnology Center Director

No matter where you go, no matter the season, both the newspapers and the television reports are full of *E. coli*. There is much being reported about bacteria, viruses, and other pathogens in our swimming and drinking water. Public health officials and DES are very concerned about the health and welfare of those who recreate in and consume our waters. Because of this concern, DES monitors 190 public beaches and over 1200 public pools and spas, as well as inspecting all boats that have a discharge capacity for toilet wastes and grey water. In fact, many of you now choose to test for *E. coli* in your own ponds for similar reasons.

Let's talk about those tiny bacteria that we are so concerned about. *E. coli*, the bacteria used for this testing, are known as indicator organisms. The concentration of an indicator organism is used to assess the probability of other associated pathogens being present. In other words, the indicator, while not necessarily harmful itself, is used to provide evidence of recent fecal contamination from warm blooded animals.

In 1986, the Environmental Protection Agency issued a revision to ambient water quality standards to include new bacterial indicators which provide better correlation with gastrointestinal disease than did the previously used fecal or total coliform tests. The new recommendations were to use *Escherichia coli* (*E. coli*) for fresh water and enterococci for marine waters. In the early 1990s, NHDES began using these new indicators. A good reason for using these bacteria is that they are specific to the feces of warm blooded animals. The previous indicators were also present in other environmental sources such as soils and leaf duff on the forest floor and, therefore, could not accurately indicate the presence of feces. The water quality standard for New Hampshire's designated public beaches is now 88 *E. coli* per 100 mL of water, or 406 counts for all other Class B waters. The ocean standard for designated public beaches is 104 enterococci per 100 mL in any one sample, or a geometric mean of 35 counts in any three samples over a 60 day period.

Now comes the confusion. *E. coli* bacteria is a subset (genera) of the coliform group, and generally, *E. coli* from human intestines are not pathogenic (disease causing). Having said that, it is not recommended that you ingest them. Their main function in the intestine is to break down basic food types. Much of the confusion and concern is rooted in the fact that not all *E. coli* are the same. A particular strain of *E. coli* called O157:H7 (found in some cattle intestines) can contaminate the beef people eat when the meat is not properly processed. This strain can be deadly when ingested by humans. The outbreaks are usually caused by ingestion of contaminated meat, but in one case an O157:H7 infected child defecated into a public pool, then infecting all other children in the pool.

Actually, those nasty waterborne pathogens that may be found in human feces and that do cause diseases are usually only tested for under special conditions, since they have long incubation periods and are costly to analyze. *E. coli* for fresh water and enterococci for salt water are probably the best indicator organisms we have right now. These do indicate fecal pollution, can be incubated within 24 hours, and the test cost is low. However, microbiologists can only tell you the number of indicator organisms in water you swam in yesterday, not what you are swimming in today, since these bacteria die relatively quickly in surface waters. So, we do recommend testing areas of concern when beach use is greatest, or after recent rains when the water table is high if septic impacts are your concern. Soil does a good job of filtering out bacteria from septic systems before they can reach the lake, unless the system is in serious failure. The good news is that illness resulting from the *E. coli* strain that we typically test for is very rare. The low concentrations of *E. coli* that we typically measure, often levels under the public beach standards, are normal for lake water due to the wildlife present, and should not be a great concern to lake users.

Impressions of N.H.'s Lakes: What Volunteers Had to Say

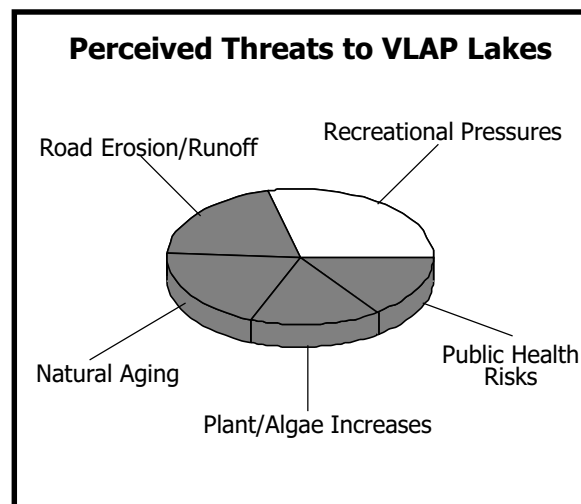
Jen Drociak, Biology Section Intern

Last year, we sent a survey to each monitor of the over 120 lakes in our assessment program. A number of monitors responded to questions such as, What is the main reason for participating in VLAP? What do you perceive to be the biggest threat to your lake? What would you like to change, improve or protect about your lake? and How can VLAP be improved? The results are in, and here is how they responded!

Twenty-nine percent of those surveyed felt that the primary reason for participating in VLAP is to increase the data that exists for their lake and establish historical trends in water quality. Twenty-six percent felt that the number one reason was to raise awareness of lake residents. Fourteen percent felt strongly about protecting lake users from health risks such as waterborne pathogens. Thirteen percent wished to learn more about lakes and water quality in general. While 11 percent participated in VLAP primarily

to obtain more information for community planning. Only 7 percent of the participants' main motivation was to stop a particular pollution source.

On a scale from 1-5 (1 being the highest and 5 being the lowest), monitors were asked to rate the biggest threat to their lake. While most of them rated their lakes as having fairly high water quality, 29 percent felt that the biggest threat currently comes from recreational use pressures such as boating and overuse. Twenty percent felt that the biggest threat comes from both road erosion and runoff, and another 20 percent suggested natural aging processes as the



major catalyst for lake changes. Roughly 16 percent agreed that the biggest threat comes from increased plants and algae. The final 15 percent were most concerned about public health risks such as bacteria and other pathogens.

When asked what they would like to change, improve, or protect about their lake, the most common ideas were more plant control, motorboat restrictions on size and usage, shoreline protection and erosion control, increased marine patrol coverage, and increased septic system maintenance by residents.

How can VLAP be improved? They suggested increasing winter sampling, increasing distribution of the annual report, a VLAP website, as well as increasing visits to the lake.

The Volunteer Lake Assessment Program thanks everyone for their continued cooperation and dedication to its goals. Your responses to the survey have been useful in helping us evaluate current trends in lake water quality. Understanding volunteers' concerns and perceptions helps us to better fit the monitoring program to all of our goals. □

Lake Trends, continued from page 1

phosphorus concentrations (which feed plant and algae growth) are all stable for the majority of lakes. Roughly equal numbers of lakes have improving or degrading quality for each of these tests.

In terms of overall trophic classification or overall quality, 19 percent are improving, 19 percent are worsening, and 62 percent, a significant majority, are showing little change over the years.

So how are so many lakes withstanding the test of time and new pressures? One theory is that when many cottages are converted to year-round homes, the septic systems are upgraded. This results in less nutrients leaching into the lake. Similarly, as development density increases, more watershed neighborhoods are becoming sewered. While more roads are being built, road maintenance practices and technologies to treat road runoff are much more advanced. Laws such as the New Hampshire Comprehensive Shoreland Protection Act have also limited the acceleration of development around our lake shores and protected the delicate shoreland areas which serve to guard our waters. And, we certainly cannot ignore the most important change in watersheds around the state: watershed residents, towns, developers, and tourists are much more aware of environmental issues and ways to protect water quality than in the past. This greater awareness is key to more informed community planning as well as more conscientious lakefront living. □

Tips for Successful Outreach in Your Watershed

Adapted from the EPA's *Nonpoint Source News-Notes*

When spearheading a volunteer effort such as protecting your local lake, it is often difficult to rally local support for your cause. More often than not, one or two people end up doing all the work, and the valuable information about lake protection does not get out to the majority of watershed residents. Here is a list of ideas put together by the Public Involvement Team of the Rouge River Project in Michigan. Try some in your watershed!

- **Aim education toward children.**

One example is provided by a grassroots organization, Friends of the Rouge, which sponsors a project that teaches water quality testing in 100 public schools. Or try holding a family "Lake Day" with fishing contests, canoe lessons, Secchi disk reading contests, scavenger hunts, boat parades, and tables set up with lake information for parents.

- **Initiate a two-way flow of information with key stakeholder groups.**

To encourage dialogue between residents and city officials in the Rouge River project, a business association organized by the residents holds monthly meetings to discuss environmental issues. These meetings are attended by representatives from local businesses, the police department, the department of public works, city hall, and the county environmental department.

- **Use available media to the best advantage.**

Movie goers at local theaters in the Rouge River watershed viewed three public service announcements designed to promote public awareness of the Rouge. Press releases on activities with human interest are also valuable.

- **Build partnerships and use the communication networks/resources of existing organizations.**

For example, the Rouge River project convened an automotive services round table that included representatives from watershed automotive businesses and the local chamber of commerce to educate small and mid-sized businesses on how to change business practices that affect the river's quality.

- **Avoid duplication of efforts.** Use information from third parties such as environmental organizations, state environmental and natural resource agencies, and the academic and scientific communities.

- **Rely on peer-to-peer communication to pass on important information.**

For example, a local member of the League of Women Voters is working to educate League members about Rouge environmental issues. The organization also helped distribute Rouge River educational materials.

- **Provide "hands-on" activities in addition to printed information.**

In one Rouge River neighborhood, the residents adopted an adjoining wetlands and participated in storm drain stenciling. Watershed or stream walks to look for erosion or document land use are another idea.

- **Understanding that before personal behavior changes occur, a target audience will go through a process of awareness, understanding, and then involvement.**

For example, promoting "Rouge Friendly" lawn and garden tips (such as using native grasses, not over-fertilizing, and allowing grass to grow longer) is part of an effort to change the aesthetic expectations and hence the behavior of landowners. Taking the offensive in lake protection or focusing efforts on enforcement often results in disinterest and little "buy-in" to lake



protection efforts by other residents.

- **Apply the "Think Globally, Act Locally" concept to an outreach program.** Focusing locally on a common resource to bring all stakeholders together will enhance any outreach efforts.

- **Avoid barriers to public participation by allowing flexibility in involvement options.** Provide a menu of activities that can be undertaken by residents to contribute to the overall watershed goals. Also provide activities with varying time commitments.

- **Educate local governments or agencies to recognize the impacts that their own activities have on the local resource.** For example, convincing the local department of public works and municipalities that more frequent street sweeping can reduce water quality impacts is one measure that the Rouge project highly recommends. Educating municipalities on how to use environmentally friendly lawn and garden care practices in parks and public spaces and encouraging them to share this information with the public is another way to reduce nonpoint source impacts.

- **Celebrate successes and have fun.** Acknowledge the contributions of citizens and businesses to let them know that they are an important and appreciated part of the watershed project. □

Damselfs and Dragons

Stephanie Bowser, NHVLAP Coordinator

Many have experienced a dragonfly landing on our knee or canoe, allowing us to examine each other in quiet curiosity. Their primitive appearance, colorful bodies, shimmering wings, iridescent eyes, and expressively tilting heads color our memories of peaceful afternoons on the lake and introspective ponderings of the surrounding natural wonders. But what we may not realize is the perfection these insects have achieved for thousands of years in their mastery of the land and water.

There are over 450 species of dragonflies and damselflies in North America alone. The dragonflies are recognizable by their more stout bodies, dissimilar hind and fore wings, and their great talents at hovering then darting with remarkable speed. The damselflies are more delicate in appearance, have similar hind and fore wings, and have a less hurried flutter. The adults of these so-called "dancers" have been long prized by New Englanders for their ability to satisfy their voracious appetites by nimbly picking mosquitoes and midges and other pests from the air in mid-flight. Fly fishermen have also found success patterning bait flies after the dragonflies.

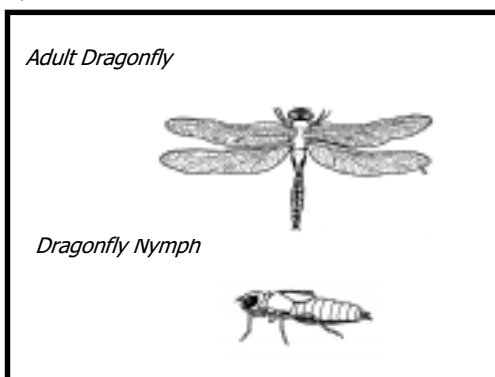
Both the dragonflies and damselflies spend the majority of their lives in ponds and slow moving streams as nymphs. Besides performing pest control, the adult flies spend their short lives out of water (a few weeks to a few months) preparing to mate. This unique coupling ritual is often observed by lake users, as two dragonflies seemingly attached in tandem. The fertile eggs are then deposited either in a slit that the female makes in an aquatic plant stem or leaf, or directly into the water. Occasionally, the female, accompanied by the male, will fully submerge for up to a full half hour to oviposit. The nymph develops from the eggs in the aquatic environment, through a process of moulting. The nymphs live as aquatic insects clinging to aquatic plants and debris for one to four years, if not first eaten by game fish. Even at this young age, their predatory skills are well developed, feeding on everything from zooplankton to small fish. Cannibalism is even common amongst the nymphs. Typically, the nymph uses its camouflage to hunt, rapidly extending its large lower lip to pierce its victim. When very hungry, the nymph will even stalk its prey.

The transformation from nymph to adult fly occurs in the summertime, when nymphs can be seen crawling out of the water and onto sticks, and rocks. We often find their brittle remains on docks at the end of the season. As the nymph grasps the stick tightly with its claws, it increases the blood pressure to the thorax, splitting its case. The

adult works its way out of its old case, pumping blood to the veins of its wings to elongate them. Within twelve hours, the still fragile adult is ready to fly away and explore its new world. If it can escape predation by frogs and birds, it lives out its life, gliding in the sunshine, visiting lucky lake folk, and completing nature's circle by finding a mate. □

"Thus the dragonfly enters upon a more nobler life than it had hitherto led in the water, for in the latter it was obliged to live in misery, creeping and swimming slowly, but now it wings the air."

- Jan Swammerdam



Get In Touch With Your New England Peers

Do you want to interact with folks from other New Hampshire lakes or lake volunteers in other states? Do you want to hear updates on conferences, meetings, and other events focused on lake protection? Join the New England Chapter of the North American Lake Management Society!

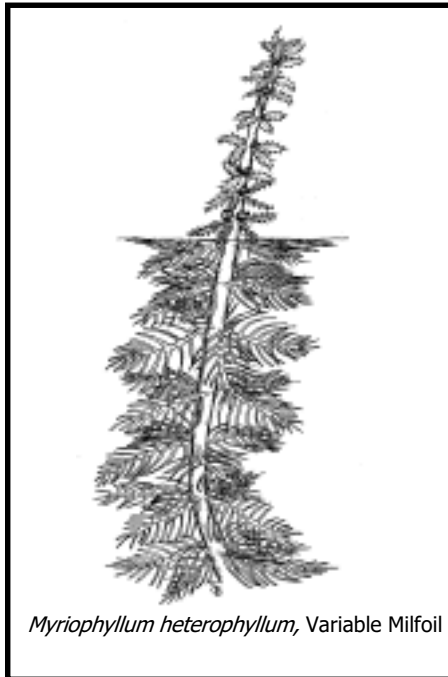
The goal of this chapter is to promote further understanding of lakes, ponds, reservoirs and impoundments, and their watersheds; the ecosystem of which they are a part, and their protection, restoration, and management.

The chapter works to facilitate the exchange of information on lake management, encourage public support for national, regional, state and local lake programs, and to provide guidance for persons planning lake management practices.

If you are interested in becoming a member, or would like more information, please contact Amy Smagula at (603) 271-2248. Membership dues are \$10 per year.

News From DES's Biology Section

Exotic Plant Program, Amy Smagula



Myriophyllum heterophyllum, Variable Milfoil

Eurasian milfoil was found in Mascoma Lake in Enfield this summer. This is only the third sighting of this plant in New Hampshire. Other infestations have been found in Mountain Pond in Brookfield (eradicated through a 3-year drawdown), and the Connecticut River in Charlestown (still present). Lake association volunteers and NHDES divers responded quickly by searching the waters of Mascoma Lake and handpulling plant and root material from the water. Continued vigilance is key.

No new findings of variable milfoil, *Myriophyllum heterophyllum*, were reported this summer. On average, one to two new infestations have been found annually since the first sighting in New Hampshire. Through the efforts of Weed Watchers, DES biologists, and public education efforts, let's hope we continue to prevent the spread of this nuisance invasive plant.

Many lakes are now represented by active Weed Watchers. Weed Watchers patrol their lakes once a month from June through August to look for new growth of both native and exotic plants. These folks are invaluable in first identifying and responding to new infestations of exotic plants-- like at Mascoma Lake. Early detection and hand pulling are our best defense against newly introduced plants spreading around a lake. **THERE IS NO SUCH THING AS ERADICATION ONCE THE PLANTS BECOME WELL ESTABLISHED...CATCH NEW INFESTATIONS EARLY!**

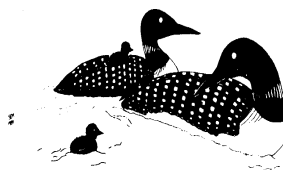
Stephanie Bowser, the VLAP Coordinator, will be on maternity leave from late February to mid May. During that time, all scheduling of appointments for the summer lake visits should be directed to Judy Reid, our section secretary, at 271-2963. I will do my absolute best to get annual lake reports out to you in a timely manner. Other staff and interns will be available during that period to address any concerns you might have as well. See you next summer!

DES has formed a **Watershed Management Bureau** which will include the former Biology Bureau and parts of the former Surface Water Quality Bureau. Paul Currier is the administrator of this bureau, while Bob Estabrook remains supervisor of the Biology Section and Jody Connor continues to head up our Limnology Center. The merging of these bureaus will enhance our ability to take a watershed perspective when approaching lake protection and help the communities that we serve have access to larger watershed resources.

DES will soon be renovating the laboratory wing where the Limnology Center resides. This will result in larger and more efficient lab space as well as easier access to the Center for the public, since we hope to install a walk-up window from the public hallway area.

Turn in Your Lead Sinkers!

We will keep a bucket in the Limnology Center to collect lead sinkers for recycling. These sinkers will soon be phased out of stores in New Hampshire, due to their role in the death of many loons.



News From DES's Biology Section

Malformed Frog Update, Angela Archer

The frog monitoring program at DES was an experiment this past season. With one year of frogging under our belts we saw the need to expand our efforts to include more of the state. Workshops were held around the state to train teams of independent froggers. The effort was a success. We had over 80 volunteers and conducted 26 successful surveys. The final tally of frogs collected was over 1,700. The malformity rate has not yet been confirmed, but general field observations seem to indicate a lower rate than last year's 3.6 percent. We are still working out the percentages for each species, and tabulating the information about the nature of the malformities we saw. The national effort, headquartered at the North American Reporting Center for Amphibian Malformities (NARCAM), will be receiving our data and adding it to the "big picture".

An interesting note about this year's surveys was that many of them were conducted on lakeshores. This was not an intentional target, but it just happened to be where the majority of frogs were "hangin' out." We suspect that with low precipitation, many of the temporary ponds and marshlands had gone dry. Whether the eggs were actually laid in these lakeshore habitats, or the froglets moved there after emerging from tadpoles is difficult to tell. We also noted a general lack of frogs this year, which could also be drought related. If the ponds dried up prior to complete metamorphosis, the tadpoles probably died.

Next year's surveys will likely be conducted in this same manner, with volunteer teams conducting their own surveys. If you would like more information, please contact Angie Archer at 271-8800, aarcher@des.state.nh.us.

Nonpoint Source Program Provides Support and Funding, Steve Couture

Undoubtedly, at least a few of you *Sampler* readers have discovered nonpoint pollution sources that you felt were impacting the water quality of your lake, pond, or its tributaries. You might have asked: how are we going to stop it and who is going to pay for it? Regrettably there is not a pot of gold at the end of the rainbow, but there is funding available through the New Hampshire Department of Environmental Services' (DES) Nonpoint Source Local Initiative Grant Program.

The Nonpoint Source Local Initiative Grant Program is available to municipalities, regional planning agencies, non-profit organizations, and conservation districts. It can be used to address nonpoint source issues ranging from contaminated stormwater runoff to streambank erosion to watershed planning. In order to apply for the grant program, you must submit a proposal that meets the requirements of the annual Request for Proposals, which historically has been issued in early September with an application deadline of mid-November. While the requirements may change, presently applicants need to meet two key criteria.

First, **40 percent of the total project expense must be provided by the applicant.** This 40 percent match can include volunteer time, town employee time, donated materials, etc. For example, the lake association or town conservation commission could submit a Nonpoint Source Local Initiative proposal for storm event monitoring to identify pollution sources. The proposal could be crafted so that 60 percent of the total funding amount could pay for sample analysis, and the remaining match could be the volunteer time (presently valued at \$10/hr) used to collect the samples.

Second, **projects should indicate a clear path towards implementation.** This simply means the applicant has to outline the schedule for the project from start to finish. Using the above example, the applicant would provide estimated dates for recruiting and training of volunteers, when the sampling window would be, and when the final report would be submitted to the DES. Since the theoretical proposal would include a monitoring component, a Quality Assurance Project Plan would have to be submitted and approved by the USEPA prior to commencement of monitoring. Not to worry, help is available!

The Nonpoint Source Local Initiative Grant Program is available to help protect the water quality of your watersheds. Though it is too late to submit a proposal for this year, it is never too early to start planning for next year's proposal! So, if you would like to know more about this program and/or receive assistance in developing a proposal, please contact Steve Couture, Watershed Protection Specialist at 271-8801.

Nonpoint Source Pollution:

Contaminants that enter our water resources from the surrounding watershed when water washes across the surface of the land or infiltrates to groundwater.

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*The Sampler is printed
on recycled paper*

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